retention of *-k-* he explains on the ground that it is an initial of the second member of a compound. That would be possible if the consciousness of its being a compound was retained up to the time when *-k-* ordinarily disappeared. But the support he gives for this contention is weak, and still further accuses him of deserting the principle of constancy. He derives *raker-*, 'to speak,' from *prakaroti* (which does not mean 'speak,' but 'accomplish'): yet the regular correspondence for Skt. *pr-* is Rom. *pr-* (Asiatic, Armenian, and perhaps English Rom. *p-*). He must therefore explain Engl. *r-*, Gk. *vr-* before he quotes this word in support, and this unfortunate lack not even Prof. Kuhn's "sehr glücklich" supplies. He derives *pariker-*, 'to thank,' from Skt. *pratikaroti*, but omits to explain why *a* appears instead of *e* in the first syllable. He derives *duriker-*, 'to foretell,' from Skt. *dūrīkaroti*, used by a scholiast on Pāṇini in the sense 'remove.' Obviously we have here not a descendant of Skt. *dūrīkaroti*, but a new Romani compound formed of two separate Romani words, *dur(i)* and *ker-*. Finally, he objects to my assumption that Skt. *-t-* would become *l*; and quotes *per-*, 'to fall,' from Skt. *patati*. *Per-* is not derived directly from Skt. *pátati*, but from Middle Indian **paṭati* (cf. Pkt. *paḍaï*), which has given rise to forms like Hindi *parnā*, while *pátati* is to be found in forms of the North-West, like Sindhi *pawaṇu*, Kashmiri *pyonu*.

In my review I quoted only one example of what I considered to be Dr. Sampson's neglect of the principle of the constancy of sound-laws, because in the space at my disposal I wished to deal with other and far more valuable aspects of his book. Nevertheless his pages abound in such examples. Lest I be accused of unfounded criticism, I select a few. *Niser-*, 'to go out,' said to be from Skt. *niṣkṛṣ-*, 'to drag out.' What has happened to the group *sk*, which becomes Middle Indian *kk*, and must remain in Romani as *k*? Skt. *niḥsarati*, 'he goes out,' provides a better etymology, which accords with Romani sound-laws. *Kam-*, 'to wish,' from *kāmayati*: yet *-m-* regularly becomes *v*; possibly from a form **kāmya-*, but probably borrowed from Persian *kām*, 'wish'; Pehlevi *kāmītan*, 'to wish.' *Kerav-*, 'to boil, from *kārayati*, 'to cause to do,' despite the fact that Skt. *ā* regularly remains Romani *a*. It is from a Middle Indian **kaṭhati* (cf. Pali *kaṭhito*, 'boiled'; Skt. *kvathati*, 'boils'). *Khino*, 'tired,' from Skt. *khinna-*, 'oppressed,' which would have given a Romani form with *χ-*: Miklosich's derivation from *kṣīṇá-*, 'worn out,' is correct, for *kṣ* becomes *kh*. *Gōrō*, 'non-gypsy,' from Skt. *guru-*, 'preceptor,' with irregular *ō* from *u*: why not (with regular phonetic change) from *gaura-*, 'light-complexioned' (cf. Hindī, *gorā*, 'European')? *Son*, continental *con*, 'moon,' from *candra-*, with irregular *o* from *a*, an unlikely development of the group *ndr* not otherwise attested: it is from Skt. *jyotsnā*, Pkt. *joṇhā*, which would regularly become Rom. *con*. *Thil-*, 'to hold,' is explained as derived from Rom. *ther-* (correctly attributed to Skt. *dharati*); but *-r-* does not become *l*, nor does *e* normally become *i*: on the contrary *-t-* does become *l*, and *ŕ* does become *i*, so that *thil-* looks like a formation from *dhṛtá-*, the past participle which has furnished Modern Indian with many present stems. *Dud*, 'light,' from *dyota-*: but *dy* becomes *j*, and *-t-* becomes *l*. *Cārō*, 'bowl,' from *caru-*: but *a* becomes *e*; why not from **caṭṭa-*, H. *cāṭā*, 'bowl for sugarcane-juice'?

This part of Dr. Sampson's work is deserving of animadversion not because he makes mistakes in etymologies—that is, alas, the fate of all etymologers—but because in making them he does not pause to pose or to explain the phonetic irregularities involved. I say again that he has not been true to the principle of the constancy of sound-laws, and (what I did not say before) that he has as a necessary consequence been driven into guess-work. He upbraids me for not mentioning that his book is the first to supply a full and systematic series of the phonetic equations of Romani: I have tried to show that it does not do so.

The second point on which Dr. Sampson takes me to task is that I have wrongly accused him of comparing Sanskrit loanwords in Hindi with Romani words, as if they had been inherited Hindi words. He now says that it is clear that the Hindi words are borrowed, and not inherited; and he quotes § 76 in support. In this paragraph, however, there is no mention of *tatsama* or loanword, but only of Hindi cognates. By that most comparative philologists will understand inherited words, not literary loanwords. Further, Dr. Sampson does not confine himself to quoting only loanwords in Hindi, but gives as many, if not more, inherited words. Thus in the passage whence I took the particular example (taken from Part I., p. 52, not from the vocabulary, "with judicious omissions," as Dr. Sampson suggests) we may read: "*t'an tχan*, 'place,' S. sthāna, P. ṭhāṇa, H. thān; *t'ulo*, 'fat,' S. sthūla, P. thulla, H. sthūl." Of these two Hindi words, one, *thān*, is inherited and strictly to be called cognate; the other, *sthūl*, is a loanword. Dr. Sampson says that he knows this (though he does not explain what value, if any, the quotation of the literary loanword has); but is he right to assume that all his readers also will know? What, finally, is his principle of selection? Why does he compare in consecutive lines *thùd*, 'milk,' with H. *dūdh* (inherited word), but *thuv*, 'smoke,' with H. *dhūm*, *dhūmā* (loanword). If it be, as he says above, "to direct attention to the fact that an inherited word, which has survived in Romani, should have been lost and artificially restored in the Modern Indian vernaculars," he is wrong; for the inherited word exists not only in the Hindi *dhuwā̃*, but also in almost every other Modern Indo-Aryan language. There are, in fact, very few, if any, Romani words of Indo-Aryan origin which have not cognates in one or other of the living languages.

No one more regrets the necessity for this criticism of Dr. Sampson's work than myself: for as a description of a particular Romani dialect, and as a most useful collection of other material, it is pre-eminent, and puts all students of Indo-Aryan in general, and of Romani in particular, under a great debt of gratitude to the author. But if he thinks that I considered it "designed as a text-book on Modern Indian dialects," I say at once—*μὴ γένοιτο*.

R. L. TURNER.

Science and Psychical Research.

I BEG space for a short comment on Dr. Tillyard's remarks in NATURE of October 23, so far as they concern my letter which appeared in the issue of October 2. Dr. Tillyard misrepresented what I said when he wrote that I had given my own interpretation of the words "super-normal phenomena." These were his own words, chosen by me because I regarded them as better fitting this discussion than either "subjects of psychical research" or "spiritualism." For I am aware that although psychical research does certainly include the study of most, if not all, of the phenomena alleged by many to be referable to some 'spiritual' origin, there are many psychical researchers who do not accept this explanation of alleged communications between the living and the dead, but prefer to interpret such communications, and others

said to occur between living persons at a far distance from one another, by attributing them to an unknown power which was long ago named 'telepathy' by one of the founders of the Society for Psychical Research.

Dr. Tillyard, in his review of the "History of Spiritualism" in NATURE of July 31, says that psychical research purports to be the scientific study of what are called "super-normal phenomena"; and divides this study into two parts, calling the first 'physical,' the second 'mental.' In the mental part, however, are included practically all the various phenomena' known generally under the term 'spiritualistic.' Seeing that the present discussion has been mainly concerned with these phenomena, I desired to make it quite clear that I was dealing only with that department of psychical research which was concerned with such phenomena as may be strictly called 'ghostly.'

Touching Dr. Tillyard's call upon me to explain what 'trance' is, I reply that I do not know. But although he says he does not know the difference between trance and sleep he knows more than I do about this matter, for he states in NATURE of Aug. 28 that "Usually the medium is in deep trance and knows nothing of what is occurring." I have seen several 'occult' cases in which strange phenomena have occurred during a period when the medium, often invisible but sometimes not so, has been stated to be in trance, and have heard first-hand accounts of many similar cases. But I have never known or heard of any independent examination being made to test the medium's alleged condition. The phenomena produced at séances with trance mediums play an important part in the exhibitions of 'super-normal phenomena,' the reports of which excite popular curiosity and pervade the journalism of to-day.

BRYAN DONKIN.

I CAN find in Sir Arthur Conan Doyle's letter in NATURE of October 16 no explanation or withdrawal of his grave but, as I have shown, entirely untrue accusation that a statement that I made about him in the issue for September 25 was a "pure invention" on my part. A. A. CAMPBELL SWINTON.

40 Chester Square, S.W.1,
October 16.

MAY I add to—and I hope end—my correspondence with Mr. Campbell Swinton by saying that I regret that I used the term "pure invention" in alluding to one of his statements, since his conclusion was a natural one with the information which he then had at his disposal. ARTHUR CONAN DOYLE.

October 21.

The Electrical Charges from Like Solids.

THE uncertainty as to the charges arising on insulating solids when rubbed together has ever provided perplexities for the investigator and pitfalls for the lecturer. I have shown in previous papers (*Proc. Phys. Soc.*, 1915, and *Proc. Roy. Soc.*, 1917 and 1926) that a clean solid, say glass, may have entirely different qualities according to the previous treatment of the surface. Ordinary dirt, adsorbed films, temperature change, and, in particular, strain left on the surface by the rough pressure of other solids, are variables which vitally influence surface electrification.

In the present brief note I want to direct attention to the charges found when two *like* solids are rubbed or struck together. Ebonite is very convenient for the purpose. Two rods of this substance are cut from the same sheet and mounted with sealing wax in glass tubes which serve as handles. The free ends of the ebonite are thoroughly but *lightly* scraped with a razor blade and then boiled for a few seconds in water. After drying and cooling, the ebonite surfaces are ready for use. They behave as follows:

(1) Placing the rods across one another, one (A) is rubbed down the other (B). We find A charged $-^{ve}$, $B+^{ve}$. Discharge the rods over, *not in*, a flame. Rub B down A. We find B charged $-^{ve}$, $A+^{ve}$. Thus the rods are identical in behaviour, the 'rubber' in each case becoming $-^{ve}$, the 'rubbed' $+^{ve}$.

When the surfaces behave alike, as above, we call them 'standard.'

There is a real distinction between 'rubber' and 'rubbed,' a much smaller area of the former than of the latter taking part in the rub; and of the two, the rubber attains at the rubbing point a higher temperature. Hence, the rubber is more likely to yield and be greatly strained under the tangential forces applied in friction.

(2) Continued rubbing brings about a change of effect; the rubber, gradually losing its strong $-^{ve}$ quality, becomes first neutral and then more and more $+^{ve}$. When in the neutral condition, the rubber may be $-^{ve}$ or $+^{ve}$ according as the rub is light or heavy. Also at this stage it is sometimes possible to obtain one charge, say, $+^{ve}$, from a direct stroke, $-^{ve}$ from a reverse.

(3) By continuing the rubbing, the rubber becomes definitely $+^{ve}$ and remains so for the actual surface rubbed even after days of inaction. I propose to call the new state of surface, produced by rubbing, the 'strained' state.

(4) The strain can be removed by boiling the rods in water for a few seconds or more, according to the amount of strain. If both rods are considerably strained, it is possible by boiling each in turn for short periods to make first one, then the other $-^{ve}$, until finally both are restored to the pristine standard state of no strain. It should be remarked that after boiling the rods are allowed to cool before rubbing.

(5) If the rods have been brought by rubbing to the intermediate state (see (2) above), suppose one rod, A, is slightly $+^{ve}$ to B. Then warming A makes it $-^{ve}$ to B. Next, warming B makes it $-^{ve}$ to A again. The rise in temperature of the surface need be only, say, 50°, and can be done by the heat from a carbon glow lamp.

(6) Sharp glancing blows of one rod on the other, whether the surfaces be standard or strained, give rise generally to contrary, *but unequal*, charges on the rods. The sum total charge is $-^{ve}$. If these impacts are oft repeated the sum total charge may be very great, and each rod may be $-^{ve}$.

In all these experiments the charges are considerable and can be easily observed with a sensitive gold-leaf electroscope.

The above behaviour of ebonite is found also with like specimens of caoutchouc, celluloid, shellac, resin, sealing wax, paraffin wax, charcoal, sulphur, glass, mica. I have found no exceptions to the rule, but that remarkable solid, caoutchouc, reveals its idiosyncrasies, in triboelectricity as in other well-known phenomena, thermal and elastic. In caoutchouc the rubber has a $+^{ve}$, not a $-^{ve}$, tendency due to rise in temperature.

Each material must be rendered standard as defined in (1) above, but the dual process of scraping and boiling, adopted with ebonite, is clearly not universally applicable.

From the above experiments three general principles, which I think are new, emerge:

(*a*) *Really identical surfaces charge one another according to a definite rule* (*Expt.* 1).